

BLM Recommended Mitigation Measures (RMMs) for Conventional Application for Permit to Drill

EOG Resources, Inc. is *under no obligation* to abide by the following recommended measures.

**Crossbow 2016 Interim Oil and Gas Exploration Project,
supported by Environmental Assessment Section WY-070- EA15-300**

Operator: EOG Resources, Inc.

Field Office: Buffalo Field Office
Address: 1425 Fort Street
Buffalo, Wyoming 82834
Office Telephone Number: 307-684-1100

Well List with Surface and Bottom Hole Lease (SHL & BHL).

Well Pad Name	Pad Status	Well Name	Surface Location	SHL	BHL
Blade 21 SENE	Proposed	Blade 4-2128H	SENW	Fee	Federal
		Blade 429-2128H	S21 T40N		
		Blade 430-2128H	R71W		
Blade 21 SENW	Existing	Blade 32-2128H	SENE S21	Fee	Federal
		Blade 433-2128H	T40N		
		Blade 434-2128H	R71W		
Blade 22 NWNW	Proposed	Blade 39-2210H	NWNW	Fee	Federal
		Blade 426-2210H	S22 T40N		
		Blade 447-2210H	R71W		
Mary's Draw 8 SESW	Existing	Mary's Draw 46-0805H	SESW S8 T40N	Fee	Fee
		Mary's Draw 55-08H	R72W		Federal
Mary's Draw 8 SWSE	Existing	Mary's Draw 51-08H	SWSE S8 T40N R72W	Fee	Federal
		Mary's Draw 495-08H			Federal
		Mary's Draw 52-0805H			Fee
Mary's Draw 13 SWSE	Existing	Mary's Draw 491-13H	SWSE S13 T40N R72W	Fee	Federal
		Mary's Draw 492-13H			
Mary's Draw 16 NENW	Existing	Mary's Draw 27-16H	NENW S16 T40N R72W	State of Wyoming	Federal
		Mary's Draw 424-16H			
		Mary's Draw 432-16H			
Mary's Draw 16	Existing	Mary's Draw 433-	NWNE	State of	Fee

Well Pad Name	Pad Status	Well Name	Surface Location	SHL	BHL
NWNE		16H	S16 T40N R72W	Wyoming	
Mary's Draw 22 NWNW	Existing	Mary's Draw 267- 2227H	NWNW S22 40N R72W	Fee	Federal
		Mary's Draw 461- 2227H			
		Mary's Draw 462- 2227H			
Mary's Draw 23 NWNE	Existing	Mary's Draw 49-23H	NWNE S23 T40N R72W	Fee	Federal
		Mary's Draw 50- 2326H			
Mary's Draw 24 NWNW	Existing	Mary's Draw 483- 24H	NWNW S24 T40N R72W	Fee	Federal
		Mary's Draw 484- 24H			

SITE SPECIFIC

Site Specific

Surface

1. When applicable (FEE FEE FED, refer to Washington Office Instruction Memorandum No. 2009-078 (S:\common\APD Processing\Reference Material\IM's & IB's) -: Prior to spudding of this well, the operator shall provide the BLM a true and complete copy of a document in which the owner of the surface or that owner's representative authorizes the operator to drill a Federal well from the non-Federal lands, and in which the surface owner or representative guarantees the Department of the Interior (Department), including BLM, access to the non-Federal lands to perform all necessary surveys and inspections. If access for any bureau of the Department to the operations and surrounding area for official business related to the approved operations is denied or impeded in any way, the BLM shall order the federally approved operations halted and the Federal well or wells shut in.
2. All permanent above the ground facilities shall be painted Covert Green per the BLM environmental color chart with the exception equipment or parts of equipment required to be painted differently for health and safety regulations.
3. When applicable: Prior to any earthwork, a preconstruction meeting shall take place including operator representatives, landowner and BLM. Contact the BLM at least 72 hours in advance at (307) 261-7600 to schedule the meeting.

Wildlife

Raptors

1. This action occurs within ½ mile of a raptor nest(s). Surface disturbing and/or disruptive activity will not be allowed from **February 1st – July 31st** within these areas. The duration of this annual seasonal restriction may be shortened or lengthened based on the fledging chronology of the chicks in an active nest. This seasonal restriction would be in effect annually for the duration of the life of this action or any subsequent activities associated with the approval of this action. The 1/2 mile restriction may be reduced to 1/4 mile depending on the species occupying the nest in accordance with the *Record of Decision and*

Approved Casper Resource Management Plan approved in December, 2007. This stipulation in no way relieves the operator from their responsibility to comply with all aspects of Federal Laws such as the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

This affects the following well pads and associated wells and infrastructure:

- Blade 21 SENE well pad, including wells Blade 3-2128H, Blade 429-2128H, Blade 430-2128H
 - Blade 21 SENW well pad, including wells Blade 32-2128H, 433-2128H, 434-2128H
 - Blade 22 NWNW well pad, including wells Blade 39-221H, Blade 426-2210H, Blade 447-2210H
 - Mary's Draw 8 SESW well pad, including wells Mary's Draw 46-0805H, Mary's Draw 55-08H
 - Mary's Draw 8 SWSE well pad, including wells Mary's Draw 51-08H, Mary's Draw 495-08H, Mary's Draw 52-0805H
 - Mary's Draw 13 SWSE well pad, including wells Mary's Draw 491-13H, Mary's Draw 492-13H
 - Mary's Draw 16NENW well pad, including wells Mary's Draw 27-16H, Mary's Draw 424-16H, Mary's Draw 432-16H
 - Mary's Draw 16NWNE well pad, including well Mary's Draw 433-16H
 - Mary's Draw 23 NWNE well pad, including wells Mary's Draw 49-23H, Mary's Draw 50-2326H
2. To avoid collision and electrocution of raptors and other avifauna, power lines on federal surface will be constructed in accordance with standards outlined in the Avian Protection Plan Guidelines (APLIC and USFWS 2005).

Grassland Obligate Species

1. Vegetation in the area is comprised primarily of grassland habitats. Surface disturbance should be minimized to the greatest extent possible to prevent the loss of grassland obligate species' habitat.

Sensitive Plant Species

1. GIS data indicates the area has the potential for the occurrence of a BLM sensitive plant species, specifically Ute ladies'-tresses and Barr's milkvetch within the project area. The likelihood has been established based on nearby observations or suitable soil composition, elevation and precipitation zone. Particularly ideal habitat for this species should be avoided and disturbances should be minimized in order to avoid unnecessary habitat loss.

Migratory Birds

1. Vegetation in the area is comprised primarily of grassland habitats. Surface disturbance should be minimized to the greatest extent possible to prevent the loss of grassland obligate species' habitat.
2. Habitat removal is prohibited during the migratory bird nesting season (May 1 – Aug 1) unless a nesting survey performed by a biologist confirms an absence of nesting birds in the disturbance area. This stipulation applies to all 4 wells referenced above (Table 1) and their associated infrastructure.
- a. Results of the nesting survey must be submitted in writing to a Casper BLM biologist prior to commencement of activities.
 - b. If the survey shows an absence of nesting birds, then habitat can be removed within 10 days of the survey. After 10 days a new survey is required.
 - c. If the survey shows nesting birds are present within the habitat that will be removed, then the activity will be delayed until nestlings have fledged.
 - d. Exceptions for alternate timelines or specific activities will be evaluated by a BLM biologist on a case by case basis.

If surveys will be conducted, the operator will follow "2013 Sage-brush BLM Sensitive Migratory Bird Nest Search Protocol" found at the following web address:

http://www.blm.gov/wy/st/en/field_offices/Bufalo/wildlife.html.

3. Migratory birds shall be effectively excluded from all facilities that pose a mortality risk, including, but not limited to, heater treaters, flare stacks, and secondary containment where escape may be difficult or wildlife toxicants are present.

Other

Paleontological

1. The operator shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The operator shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The operator may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The Authorized Officer will evaluate, or will have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator. Within 10 days, the operator shall be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area (IM 2009-011 I.B.4.a).
2. When applicable: The operator shall have a BLM permitted paleontologist monitor all surface-disturbing activities during construction of the access road and well pad.

Archaeological

1. The operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the Authorized Officer (AO) of the BLM Casper Field Office. Within five working days the AO will inform the operator as to: (1) whether the materials appear eligible for the National Register of Historic Places; (2) the mitigation measures the operator shall likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and, (3) a timeframe for the AO to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the finds of the AO are correct and that mitigation is appropriate. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the operator shall then be allowed to resume construction measures.

Geologic

1. When applicable: All wells processed through the Casper Field Office shall meet the following logging requirements:
 - a. Calibrated gamma ray log scaled in API units from total depth to surface, with a repeat section over hydrocarbon producing zones. Maximum logging speed 3,600 ft. /hour in open hole and 2,000 ft. /hour in cased hole.
 - b. Multiple depth-of-investigation resistivity log from surface casing to total depth (TD) or kick off point, plus a compensated density-neutron log over potential hydrocarbon producing zones. This logging suite is often referred to as a triple combo. A pulsed neutron log may be substituted for a triple combo if a suitable quality triple combo log exists within one-half mile. Substitution of a pulsed neutron log for open hole logs will not be approved for an exploratory well.

- c. For all logs, Log ASCII Standard (LAS) files shall to be provided to BLM. If a pulsed neutron log is permitted in lieu of open-hole logs, LAS files for both the field print and processed data shall to be provided to the BLM.
 - d. A cement bond log shall be run if the well is cased and perforated for production, injection, or disposal. The logged interval should extend from TD to 200 ft. above the top of cement, or to the surface.
2. When applicable: The operator may request a variance from the Logging Requirements when the following conditions are met. In all cases, a variance request in the form of a Sundry Notice must be submitted.
 - a. When multiple boreholes shall be drilled from the same pad, after the logging requirements have been met for the first borehole and if subsequent boreholes are not substantially deeper in vertical depth, then a variance request may be granted on the remaining boreholes.
 - b. If it can be shown that the logs from a borehole within 1,500 feet exist to meet the requirements, a variance may be granted for the compensated density-neutron and multiple depth of investigation resistivity logs, requiring only the calibrated gamma ray log.
 - c. If it can be shown that an adequate triple combo logs from a borehole within 2,640 feet (1/2 mile) exist to meet the requirements, a variance may be granted for the subject well, allowing an adequately processed pulsed neutron log instead of a triple combo.

Drilling Operations

1. Verbal notification shall be given to the Authorized Officer at least 24 hours before formation tests, BOP tests, running & cementing casing, and drilling over lease expiration dates.
2. Notify the Casper Field Office (307) 261-7600 to schedule a PRE SPUD Meeting, between the operator and the PET assigned to the well for inspection and regulation compliance.
3. Any changes to the approved drilling plan shall be approved by the BLM Casper Field Office Petroleum Engineer prior to being implemented.
4. The operator shall install an identification sign consistent with the requirements of 43 CFR 3162.6 immediately upon or before the completion of the well pad construction operations. All wells, whether drilling, producing, suspended, or abandoned shall be identified in accordance with 43 CFR3162.6. There shall be a sign or marker with the name of the operator, the lease serial number, the well number, and the surveyed description of the well.
5. All Blow Out Prevention Equipment (BOPE) tests shall include a 5 minute low pressure test between 250 psi and 500 psi with no drop in pressure with the only exception being the chokes. The chokes are only required to have the high pressure test held for a minimum length of time necessary to verify their functional integrity.
6. All Blow Out Prevention Equipment (BOPE) rated 5M or greater shall be isolated from the casing and tested to stack working pressure. All Blow Out Prevention Equipment (BOPE) tests shall be performed by a suitable test pump, not the rig-mud pumps and recorded on a chart. The chart shall be submitted to the Casper Field Office.
7. Low test on Blow Out Prevention Equipment (BOPE) shall be performed and passed before moving onto the high test for each component.
8. If there are indications of inadequate primary cementing of the surface, intermediate, or production casing strings; such as but not limited to no returns to surface, cement channeling, fallback or mechanical failure of equipment, the operator shall evaluate the adequacy of the cementing operation. If the evaluation

indicates inadequate cementing, the operator shall contact a BLM Casper Field Office Petroleum Engineer for approval of remedial cementing work.

9. The adequacy of any remedial cementing operations shall be verified by a cement bond log (CBL) or an alternate method approved by the Authorized Officer (AO). All remedial work shall be completed and verified prior to drilling out the casing shoe or perforating the casing for purposes other than remedial cementing.
10. The cement mix water used must be of adequate quality so as not to degrade the setting properties of the cement. Any water that does not meet municipal quality water standards shall be tested by mixing the water and cement in a lab and comparing the results to the municipal quality water mix results. If the results show that the cement qualities are not the same or greater, than the non-municipal water shall not be used for mixing cement in the well.
11. All oil and gas operations shall be conducted in a manner to prevent the pollution of all freshwater resources. All fresh waters and waters of present or probable future value for domestic, municipal, commercial, stock or agricultural purposes will be confined to their respective strata and shall be adequately protected. Special precautions will be taken to guard against any loss of artesian water from the strata in which it occurs and the contamination of fresh water by objectionable water, oil, condensate, gas or other deleterious substance to such fresh water.
12. The operator shall report encounters of all non-oil & gas mineral resources (such as Gilsonite, tar sands, oil shale, trona, etc.) to the Field Office, in writing, within 5 working days of each encounter. Each report shall include the well name/number, well location, date and depth (from KB or GL) of encounter, vertical footage of the encounter and, the name of the person making the report (along with a telephone number) should the Field Office need to obtain additional information.
13. No well abandonment operations shall be commenced without the prior approval of the Authorized Officer. In the case of newly drilled dry holes or failures, and in emergency situations, oral approval shall be obtained from the Casper Field Office petroleum engineer. A notice of Intention to Abandon (form #3160-5) shall be filed with the Authorized Officer within fifteen (15) days following the granting of oral approval to plug and abandon the well.
14. Pursuant to NTL-4A, lessees and operators are authorized to vent/flare gas during initial well evaluation tests, not exceeding a period of thirty (30) days or the production of cumulative fifty (50) mmcf of gas, whichever occurs first. An application must be filed with the Authorized Officer, and approval received, for any flaring/venting of gas beyond the initial thirty (30) day or otherwise authorized test period. If approved, the operator shall meter the amount of gas flared using the following guidelines: Onshore Oil and Gas Order No.5, Measurement of Gas Oil & Gas Leases within the Jurisdiction of the Wyoming State Office – (NTL 2004-1). The operator shall pay royalties to ONRR for the volume of gas flared using code 08.
15. Within sixty (60) days following construction of a new tank battery, a site facility diagram of the battery depicting actual conditions and piping shall be submitted to the Authorized Officer. Facility diagrams shall be filed within sixty (60) days after existing facilities are modified.
16. A progress report shall be filed a minimum of once a month starting with the month the well was spud and continuing until the well is completed. The report shall be filed by the 25th of each month on a Sundry Notice (Form 3160-5). The report shall include the spud date, casing information such as size, grade, weight, hole size, and setting depth, amount and type of cement used, top of cement, depth of

cementing tools, casing test method, intervals tested, perforated, acidized, fractured and results obtained and the dates all work was done.

General Conditions of Approval

1. The operator shall be responsible for erosion control measures for the entire project. If necessary the operator shall use standard erosion control methods including things like erosion fences, hay bales, straw wattles etc. If these strategies are unsuccessful the situation will be reassessed with the BLM and private surface owners until the erosion is acceptably controlled.
2. The operator shall be responsible for weed control in disturbed areas as well as areas adjacent to the disturbance. This includes following the terms and conditions on the approved pesticide use proposal (PUP). All pesticide applications on BLM surface will be conducted by a Certified Pesticide Applicator and will apply pesticides approved by the BLM, per Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Wyoming Environmental Pesticide Control Act of 1973.
3. No construction or drilling equipment movement shall be allowed when the road surface is too wet to safely support construction, drilling, or other heavy equipment transport. If such equipment creates excessive rutting, greater than four (4) inches, the soil shall be deemed too wet and all road construction and all other road activities shall cease until the roadway can be safely utilized.
4. Unused equipment and trash shall be removed from the location and disposed of in an approved landfill. Equipment will be maintained to be properly functional throughout the life of the well.
5. The Operator shall notify the BLM office 72 hours prior to beginning surface disturbing activities to provide advanced warning time to allow a representative from this office to witness construction activities.
6. The environmental protection measures identified by the operator which are included in the Surface Use Plan and Drilling Plan are considered by the BLM to be applicant-committed Best Management Practices (BMP's) and are required to be implemented in the same manner as a Condition of Approval.
7. The operator shall be responsible for submitting a Sundry Notice (BLM Form 3160-5) for the well pad facilities before construction of those facilities begins.
8. CFR §3161.2 says that it is "Responsibility of the authorized officer to approve, inspect and regulate the operations that are subject to the regulations in this part." Part (b) goes on to say, "The operator shall permit properly identified authorized representatives to enter upon, travel across and inspect lease sites and records normally kept on the lease pertinent thereto without advance notice. Inspections normally will be conducted during those hours when responsible persons are expected to be present at the operation being inspected. Such permission shall include access to secured facilities on such lease sites for the purpose of making any inspection or investigation for determining whether there is compliance with the mineral leasing laws, the regulations in this part, and any applicable orders, notices or directives." Per CFR 3163.2(e)(1), operator rights owner or operator are subject to civil penalties if they "fail or refuse to permit lawful entry or inspection authorized by 3162.1."
9. Approval of this APD does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon. In addition, approval of this APD does not imply that the operator has legal access to the drilling location. When crossing private surface, 43 CFR 3814 regulations must be complied with and when crossing public surface off-lease the operator must have an approved right-of-way.
10. All undesirable events (fires, accidents, blow-outs, spills, and discharges) as specified in NTL-3A will be reported to the Casper BLM Field Office. Major events will be reported verbally within twenty-four (24)

hours and will be followed with a written report within fifteen (15) days. Other than major events will be reported in writing within fifteen (15) days. Any spilled or leaked oil, produced water or treatment chemicals must be immediately cleaned up in accordance with BLM requirements. This includes proper disposition of soils contaminated as a result of such spills/leaks.

11. This APD is valid for a period of two years from the date of approval or until the oil and gas lease expires/terminates, whichever occurs first. If the APD terminates, any surface disturbance created under the application must be reclaimed in accordance with the approved plan.
12. All operations must be conducted in accordance with all state, federal and local applicable laws and regulations: with the lease terms, Onshore Oil and Gas Orders, NTLs; and with other orders and instructions of the Authorized Officer, unless a variance has been granted in writing by the Authorized Officer.
13. Per Onshore Oil and Gas Order Number 1, VI, 1, "The operator must make a good faith effort to provide a copy of their Surface Use Plan of Operations to the surface owner. After the APD is approved the operator must make a good faith effort to provide a copy of the Conditions of Approval to the surface owner.
14. A complete copy of the approved APD, Conditions of Approval and all approved Sundries must be at the drill site during the construction of the roads and drill pad, the drilling of the well, and the completion of the well.
15. The operator shall be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in specific areas.
16. All survey monuments found within the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U. S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported in writing to the Authorized Officer.
17. If at any time the facilities located on public lands authorized by the terms of the lease are no longer included in the lease (due to a contraction in the unit or other lease or unit boundary change) the BLM will process a change in authorization to the appropriate statute. The authorization will be subject to appropriate rental or other financial obligation determined by the Authorized Officer.
18. Pits will be managed in conformance with Onshore Oil and Gas Order Number 1 and 7 (Disposal of Produced Water) and WY-IM-2012-007 (Management of Oil and Gas Exploration and Production Pits).
 - a. No hydrocarbons should enter any pit except in an emergency. Each such occurrence must be reported to Authorized Officer and the hydrocarbons will be removed from the pit immediately.
 - b. Pits containing fluid must not be breached (cut) and pit fluids must be removed or solidified before backfilling. Pits may be allowed to air dry subject to BLM or FS approval, but the use of chemicals to aid in fluid evaporation, stabilization, or solidification must have prior BLM approval.
 - c. For the protection of livestock and wildlife, all pits, including open cellars and flare pits, shall be fenced. Fencing shall be in accordance with BLM specifications. The reserve pit will be fenced on three sides during drilling and the fourth side will be fenced when drilling is completed. The reserve pit will remain fenced until reclamation is initiated.
 - d. Following completion activities, pit liners will be cut and removed down to the solids level and disposed of at an approved landfill or folded over and buried under at least three feet of material, to prevent their

reemergence to the surface and interference with long-term successful re-vegetation.

- e. In compliance with Onshore Oil and Gas Order Number 7, produced water from newly completed wells may be temporarily disposed of into pits for a period of up to 90 days if the use of the pit was approved as a part of an APD. An extension of time beyond this requires documented approval by the authorized office.
 - f. Prior to pit closure, the BLM Casper Field Office will be notified at least 72 hours prior to taking pit samples for analysis (307-261-7600) in order to witness the method used. Pit contents will be sampled and submitted to an approved laboratory for analytical analysis per WOGCC guidelines. The analytical analysis will be submitted to the BLM Casper Field Office through a Sundry Notice (Notice of Intent) requesting approval for pit closure. Pits will not be closed until receiving Sundry Notice approval from the BLM Casper Field Office.
19. In compliance with Onshore Oil and Gas Order Number 1, all earthwork, seeding or other activities to reestablish vegetation for interim and final reclamation must be completed within 6 months of well completion or well plugging (weather permitting). All pads, pits, pipelines, roads, etc must be reclaimed to a satisfactorily revegetated, safe, and stable condition, unless an agreement is made with the landowner or Surface Managing Agency to keep the road or pad in place. Native vegetation is required on BLM surface.
 20. Any changes to the approved surface use plan or these conditions of approval shall be submitted via Sundry Notice (Form 3160-5) and approved by the BLM Authorized Officer prior to being implemented.

Dry Hole/Reclamation

1. All disturbed lands associated with this project, including the pipelines, access roads, water management facilities, etc., will be expediently reclaimed and reseeded in accordance with the Surface Use Plan, any pertinent site-specific COAs and CFR 3162.3-4(c).
2. The operator must submit a Sundry Notice of Intent to Abandon and a Subsequent Report of Abandonment for abandonment approval.

Producing Well

1. Within 30 days of any surface disturbing activities, the operator shall provide to the BLM Casper Field Office an as built Geographic Information System (GIS) shapefile depicting all surface disturbances including, but not limited to the well pad, access road, pipeline and powerline. The shapefile shall be provided in NAD 83 UTM Zone 13 projected coordinate system.
2. The load out line coming from the oil/condensate tank(s) shall have a suitable containment structure to capture and recycle any oil spillage that might occur.
3. Any chemicals used in treating the wells (e.g., corrosion inhibitor, emulsion breaker, etc.) shall be in a secure area with an appropriate secondary containment structure (dikes, catchment pan, etc.).